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Arnold Schwarzenegger, Governor

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# **CHAPTER 10: CALIFORNIA-MEXICO BORDER REGION ENERGY ISSUES**

## **Introduction**

The California – Baja California Norte border region extends about 60 miles (100 kilometers) north and south of the California-Mexico border and links the two countries in a complex network of trade, cultural, social, and institutional relationships. The region includes the San Diego and Imperial counties of California and the Mexican cities of Tecate, Tijuana, Mexicali, Rosarito, and Ensenada.

The border region's population and businesses are growing rapidly. This growth is driving energy demand, which is in turn driving the need for new power plants, transmission lines, and natural gas facilities. Generation from new natural gas-fired power plants in the region will predominantly meet this growing demand for electricity, though attention is increasingly focused on developing renewable energy resources. At least one liquefied natural gas (LNG) facility is also being built in Baja California Norte to meet energy demand both locally and in California.

The border region is becoming an energy corridor as both sides of the border develop facilities to meet local needs and export energy across state and international borders. The energy relationship between California and Baja California Norte is expected to become even more interdependent in the future as new generation, transmission lines, LNG facilities, and natural gas pipelines are built to meet the region's increasing energy needs.

The growing demand for energy in the border region is adding to already significant air pollution problems. Yet fundamental differences persist in regulatory approaches on both sides of the border. A binational policy is urgently needed to coordinate energy and environmental issues in the border region. State and regional organizations including the Border Governor's Energy Worktable, Border Energy Issues Group, San Diego Association of Governments, and San Diego Regional Energy Office are working together to address many energy and environmental issues and improve both the economic vitality and quality of life in the border region.

## **Border Region Growth**

The current population of the border region is close to 5 million and expected to grow to more than 7.5 million over the next 25 years. The greatest population densities are in San Diego, Tijuana, and Imperial Valley-Mexicali.

The driving economic force in the region continues to be the companies on the Mexican side of the border that manufacture or assemble a variety of products and equipment, known as the maquiladora industry. The North American Free Trade Agreement

(NAFTA), passed in 1993, accelerated the growth of the maquiladora industry when U.S. companies subsequently located manufacturing plants in northern Mexico to reduce production costs and finish products for export either back to the U.S. or to other countries. NAFTA and other trade relationships with Mexico and Canada were also instrumental in San Diego's economic recovery from the recession of the first half of the 1990s. Over 700 maquiladora plants are now located in Baja California Norte.

## **Border Region Energy Demand**

### ***Electricity***

Peak electricity demand in San Diego Gas and Electric's (SDG&E) service territory reached a record 4,065 MW in summer 2004. The Energy Commission estimates average annual growth rates of 2.1 percent for system peak load and 1.7 percent for electricity demand in SDG&E's service territory for 2004 - 2009. For the Imperial Irrigation District (IID), peak electricity demand is expected to increase from 840 MW in 2004 to about 1,000 MW by 2016.

The growth in electricity demand in Baja California Norte is expected to be the highest of any state in Mexico over the next 10 years. To meet this demand, Baja California Norte will need to almost double its electricity capacity.<sup>231,232</sup> In its official 2004-2013 electricity demand forecast, Mexico's Comisión Federal de Electricidad anticipates energy sales in Baja California Norte to increase an average of 7 percent and peak demand to continue to grow by 6.3 percent per year.

### ***Natural Gas***

Natural gas demand in SDG&E's service territory is forecast to grow 2.5 percent annually.<sup>233</sup> The primary driver for this gas demand in the near term is the natural gas needed to fuel new power plants. Demand for natural gas in Baja California Norte is driven mainly by power generation, a handful of industrial customers, and one local distribution company in Mexicali that serves about 25,000 customers.

## **Border Region Interdependencies**

California and Baja California Norte share considerable natural gas and electricity infrastructure within the border region. Baja California Norte is geographically isolated from mainland Mexico, with no connections to Mexico's natural gas pipeline system and only limited connections to Mexico's national power grid.

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<sup>231</sup> *California-Mexico Border Energy Issues* staff report, prepared in support of the 2005 Integrated Energy Policy Report Proceeding, July 2005.

<sup>232</sup> Western Governors' Association, April 2004, *Energy Efficiency in the Border Region: A Market Approach*, The Western Governors' Association, Denver, CO, pp. 6-10.

<sup>233</sup> California Energy Commission, *Revised Reference Case in Support of the 2005 Natural Gas Market Assessment*, September 2005, CEC-600-2005-026-REV.

## **Electricity**

SDG&E consumes 3.5 times more power than Baja California Norte, cannot meet its customer demand solely with local generating capacity, and must import about 60 percent of its electricity from outside the region.<sup>234</sup> SDG&E's generating capacity is about 2,570 MW. Two new power plants are under construction in San Diego County, however, which will add more than 1,000 MW of capacity to SDG&E's system.

Electricity is imported through the Miguel Substation from the east and south and the San Onofre switchyard to the north. SDG&E can import electricity from out of state through the 500-kilovolt (kV) Southwest Power Link Transmission Line and from Mexico through two 230-kV transmission lines (Path 45).<sup>235</sup> The CPUC approved the Miguel-Mission No. 2 230-kV Transmission Line in 2004, which is expected to be operational by June 2006. This project will increase the system's ability to transfer electricity from the two power plants in Mexicali, Mexico, and from new generation in Arizona that is scheduled into the CA ISO control area at Palo Verde.<sup>236</sup>

Conversely, IID has historically been a net exporter of electricity. IID provides 468 MW of capacity within the border region and connects its transmission system with SCE through the Valley and Devers substations, with SDG&E through the Miguel and Imperial Valley substations, and with the Palo Verde hub in Arizona. It also interconnects with Mexico through the Miguel Substation.

The Baja California Norte power system has 3,862 MW of generation capacity, with 2,652 MW dedicated to satisfy the Comisión Federal de Electricidad's public service load and 1,210 MW for export to California. Baja California Norte also satisfies a significant portion of its energy needs with 720 MW of renewable geothermal energy with the balance of its generation coming from natural gas-fired combined-cycle units (985 MW), oil-fired steam-cycle plants (620 MW), and oil-fired gas turbines (326.9 MW). The Comisión Federal de Electricidad plans to build an additional 1,282 MW of generating capacity in Baja California Norte between 2008 and 2013. Most of this planned generation is expected to be natural gas-fired.

Path 45 is the backbone of the transmission system in Baja California Norte, connecting it with San Diego and the Imperial Valley and allowing power transfers between Northern Mexico and Southern California. One transmission line runs between SDG&E's Miguel Substation and the Comisión Federal de Electricidad's Tijuana Substation, and the other between SDG&E's Imperial Valley Substation and the Comisión Federal de Electricidad's La Rosita Substation. Additional study is needed to

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<sup>234</sup> Western Governors' Association, April 2004, *Energy Efficiency in the Border Region: A Market Approach*, The Western Governors' Association, Denver, CO, p. 6.

<sup>235</sup> San Diego Gas & Electric Company, July 9, 2004, *Long-Term Resource Plan of San Diego Gas & Electric Company (U 902 E)*, direct testimony of Linda P. Brown, California Public Utilities Commission, pp. 2-3.

<sup>236</sup> California Public Utilities Commission, Decision 04-07-026, *Application of San Diego Gas & Electric Company (U 902 E) for a Certificate of Public Convenience and Necessity for the Miguel-Mission 230kV #2 Project*, Application 02-07-022, p. 19.

determine the upgrade potential of the east-west transmission line in Baja California between the Path 45 cross border paths.

## **Natural Gas**

Several high-capacity natural gas pipelines crisscross the border region. The Baja Norte Pipeline, completed in 2002, runs from Ehrenberg, Arizona through Mexicali and interconnects with the Transportacion de Gas Natural pipeline in Tijuana. PG&E owns the U.S. segment (North Baja Pipeline), and Sempra Energy controls the segment in Mexico (Gasoducto Bajanorte). The Gasoducto Bajanorte segment serves the La Rosita and Thermoelectrica de Mexicali power plants in Mexicali and industrial customers in northern Baja California Norte and Southern California.

Sempra's pipeline runs from Otay Mesa near Tijuana to Playas de Rosarito, where it supplies natural gas to the Presidente Juarez Power Plant. Sempra also supplies natural gas through a separate pipeline to the local distribution company in Mexicali.

Baja California Norte must import its gas from the U.S. through the Transportación de Gas Natural and Baja Norte pipelines since the region has no local sources of natural gas. The development of one or more proposed liquefied natural gas (LNG) gasification and storage facilities will increase natural gas supply sources for the region and make Baja California Norte a net exporter of gas to the U.S. Sempra's Energia Costa Azul Project is under construction and Chevron's Terminal GNL Mar has received initial permits. The Energia Costa Azul Project is expected to operate in 2007 and provide an average capacity of 1,000 million cubic feet per day (MMcfd) of natural gas. Chevron's plant will produce 700 MMcfd and is scheduled to go online in 2007.

Sempra is planning to expand its Baja Norte and Transportación de Gas Natural pipelines to transport natural gas from the Energía Costa Azul LNG terminal. It is unclear, however, how SDG&E and Southern California Gas (SoCalGas) will plan and pay for future pipeline upgrades and coordinate cross-border delivery of gas into California. Other uncertainties include the amount and specific use (for example, power plants, commercial, residential) of the LNG supply dedicated for California, other parts of the U.S., and Baja California Norte.

In San Diego and Imperial counties, SDG&E distributes natural gas from SoCalGas and moves it south to load centers. The total capacity of the SDG&E natural gas transmission system is 620 MMcfd in winter and 600 MMcfd in summer.<sup>237</sup> Accepting LNG supplies from Mexico at Otay Mesa will require infrastructure improvements allowing the reversal of the flow of the gas in the SDG&E system. Other improvements may also be necessary to the SDG&E system, depending upon the amount of LNG delivered to Otay Mesa.<sup>238</sup>

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<sup>237</sup> CPUC, November 2001, *California Natural Gas Infrastructure Outlook, 2002-2006*.

<sup>238</sup> San Diego Gas & Electric Co., November 2003, *Responses to CPUC Data Requests, OIR to Establish Policies and Rules to Ensure Reliable, Long-Term Supplies of Natural Gas to California*, R.04-01-025.

## Border Region Renewable Resources

SDG&E is required by state law to have a 20 percent renewable portfolio mix by 2017. The utility has committed to achieving this goal sooner, by 2010. A recent study identified significant solar energy, biomass, geothermal, and wind power opportunities in the California-Mexico border region.<sup>239</sup> This study is an important first step, though more detailed assessments are needed to ultimately stimulate additional renewable resource development in this area.

Obtaining renewable energy from Baja California Norte is more problematic because it would require costly upgrades to the existing transmission system to bring power across the border from the Cerro Prieto geothermal field and potential wind resources in La Rumorosa.

Facilities in Imperial County currently produce 635 MW of renewable energy, with an additional 270 MW of geothermal and 80 MW of biomass proposed for development. As a publicly owned utility (POU), IID is not required to meet the specific targets and timelines of the state's RPS. IID has, however, voluntarily adopted its own RPS. To reach its renewable goals, IID is negotiating to purchase approximately 200 MW of energy from Cal Energy's Salton Sea Unit 6, now under construction.<sup>240</sup>

Baja California Norte meets a large portion of its energy needs with renewable energy. The Cerro Prieto geothermal field provides 720 MW of geothermal generating capacity, and studies show additional potential both there and elsewhere in the region. The area also has promising potential for wind development, although further studies are needed to fully understand this resource potential. Mexico has set the national goal of bringing an additional 1,000 MW of renewable energy online by 2006.

## Transportation

The 150-mile border between California and Mexico contains six points of entry: San Ysidro, Otay Mesa, and Tecate in San Diego County, and Calexico, Calexico East, and Andrade in Imperial County. In 2003 alone, 47 million people crossed the border northbound through San Ysidro, which is the busiest land crossing in the world.<sup>241</sup>

As noted earlier, cross-border trade between California and Mexico has increased substantially since the passage of NAFTA. In 2003, total trade activity totaled nearly \$30 billion, with approximately 98 percent of this trade transported by truck through Otay Mesa, Tecate, and Calexico East.<sup>242</sup> There were 2,000,000 truck crossings at the border in 2003; this number is expected to increase to 5.6 million by 2030. Most of this truck

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<sup>239</sup> *Potential for Renewable Energy in the San Diego Region*, San Diego Regional Renewable Energy Group, August 2005.

<sup>240</sup> Imperial Irrigation District, press release: *IID Energy Honored for Geothermal Excellence* September 9, 2001. Found at: [[www.iid.com/pressbox/press.read.php3?which=454](http://www.iid.com/pressbox/press.read.php3?which=454)].

<sup>241</sup> California/Mexico Border Briefing, p. ii.

<sup>242</sup> *Ibid*, p. V-3.

transport across the California-Mexico border at the three main entry points originates at or is destined for locations outside San Diego and Imperial counties, including the ports of Long Beach and Los Angeles and the Los Angeles and Ontario airports.<sup>243</sup>

Idling cargo trucks emit harmful pollutants that affect air quality on both sides of the border. These trucks usually refuel in Mexico with fuel that can contain many times more sulfur than fuel sold in California.<sup>244</sup> Shifting some of this cargo and freight to railroads and switching to cleaner-burning diesel and non-petroleum fuels could reduce both congestion and diesel use, ultimately improving air quality. The establishment of clean cities programs in the San Diego-Tijuana and Calexico-Mexicali areas and the imposition of per-truck border crossing fees could raise funding for cross-border transportation projects.

## **Air Quality and Cross-Border Emissions Trading**

The transportation sector is the major source of emissions in the border region. Because the region is subdivided into two binational air sheds that span the international border, neither government alone is able to address regional air pollution. Air pollution in the border region violates most ambient air quality standards in both the U.S. and Mexico for ozone and particulate matter. Carbon monoxide levels on the Mexican side of the border also exceed established standards. Increasing population in the border region and the associated increase in the number of automobiles and cargo trucks will only exacerbate this problem over time.

Cross-border emission trading has been effective in reducing air pollution in other parts of the world and could potentially reduce emissions in the border region. This concept faces challenges, however, including the legality of establishing international air basins, the enforceability of international credits, the lack of an existing emission credit program in Mexico, and the inconsistency of air quality monitoring data on both sides of the border. Emission trading could well require additional air quality monitoring programs. More investigation of this issue is clearly needed, though available information indicates the strong potential for environmental and economic benefits for both countries.

## **Border Region Efficiency**

There is significant potential for reducing the rate of growth in electricity demand on both sides of the border through demand reduction and combined heat and power (CHP) projects. A study conducted by the Western Governors' Association estimated that the potential energy efficiency savings for manufacturing facilities in Baja California

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<sup>243</sup> Caltrans, pp. 2-3.

<sup>244</sup> Kazimi et al. 1997 (C. Kazimi, F. Cuamea, J. Alvarez, A. Sweedler and M. Fertig). *Emissions from Heavy-Duty Trucks at the San Diego-Tijuana Border Crossing*, San Diego State University and Universidad Autonoma de Baja California. San Diego, California and Tijuana, Baja California. San Diego State University Press. February 1997.



Norte would be the highest in the region.<sup>245</sup> Average energy savings were estimated at 26 percent, and projected payback periods ranged from 1.3 to 6.0 years. The study also estimated that energy efficiency projects could reduce energy demand by as much as 10 percent in Baja California Norte.

While there is already awareness and active interest in both energy efficiency and load management in Baja California Norte, state and local energy efficiency assistance programs lack the technical and financial resources to have a significant overall impact on the supply-demand balance in the region.

## **Recommendations:**

The state should establish a cross-border, binational policy to:

- Ensure that the planning, permitting, construction, and operation of electricity and natural gas infrastructure in the border region are coordinated and comply with the highest levels of environmental standards.
- Implement a common methodology to accurately forecast energy demand in the border region.
- Implement a loading order to encourage the development of the most efficient, clean, and cost-effective energy options.
- Develop programs to reduce demand and develop indigenous renewable resources.
- Develop and implement a cross-border emissions credit trading and offset program.
- Create opportunities to both improve the overall efficiency of transportation systems and expand the use of non-petroleum fuels.

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<sup>245</sup> *Energy Efficiency in the Border Region: A Market Approach*, Western Governors' Association, April 2004.